PLATES

ILLUSTRATING

THE NATURAL AND MORBID CHANGES

OF

THE HUMAN EYE.

BY

C. BADER,

OPHTHALMIC ASSISTANT SURGEON TO GUY'S HOSPITAL.

LONDON:

N. TRÜBNER & CO., 60, PATERNOSTER ROW.

1868.

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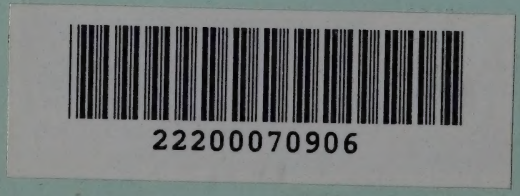
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INTRODUCTION.

THE originals, from which the chromolithographs are copied, were painted by Mr R. Schweizer (13, Myddleton Place, St John's Street Road, Clerkenwell), to whose talent as painter, and to whose skill in the use of the ophthalmoscope, I am indebted for their correct representation. Each chromolithograph shows the parts as they appeared when examined with the ophthalmoscope indirectly. They are, therefore, represented inverted: for example, what in the chromolithograph appears as the upper margin of the optic disc is in reality the lower margin, &c. The shape of the optic disc in each case is represented correctly, while the size exceeds more or less that observed with the ophthalmoscope.

Much delay has been occasioned in the publication of the plates by my having had to reject chromolithographs from two different sources.

The lithographs (Plate I. to IV.) were made by Mr E. Erxleben, 2, Coram Street, Russell Square, and Messrs Day and Son, London.

The drawings representing the instruments which are most frequently used in operations on the eye, are copies of the excellent instruments manufactured by Messrs Weiss & Son, Surgical Instrument Makers, 62, Strand, London.

The Plates are published separate from the book, because the time of their completion was uncertain; and also for the purpose of facilitating their study, as well as to allow the plates to be purchased without the book.

EXPLANATION OF THE PLATES.

PLATE I.

Fig. 1.

Section of a portion of healthy retina. The section was made parallel with the optic nerve fibres, and about one-sixth of an inch horizontally inwards from the optic disc. The object of this Plate is to show the fibres of the connective tissue of the retina ("the radial fibres") and their connection with the inner membrana limitans.

(1.) The inner membrana limitans.

(2.) Granular matter between the inner membrana limitans and the optic nerve fibres, occupying the place where the membrana limitans has become detached from the nerve fibres.

(3.) Layer of optic nerve fibres.

(4.) Fibres of the connective tissue of the retina—so called "radial fibres."

(5.) The part of the retina occupied by the "layer" of ganglion cells.

(6.) Granules.

Fig. 2.

Section of a portion of healthy retina. The section was made parallel with the optic nerve fibres, and taken from a part of the retina situated above, and about one-eighth of an inch from, the optic disc.

(1.) Granules.

(2. 2.) Fibres of the framework of the retina—"radial fibres."

(3.) The outer membrana limitans.

(4.) A bulb.

(5.) A rod.

The granules are separated from each other by fibres of the connective tissue which branch off from those which take a radiating course through the retina.

Fig. 3.

A portion of healthy vitreous substance taken from near the hyaloid fossa.

(1.) Oval-shaped corpuscle. Of these several occur in the same transparent filament, giving rise to a succession of dilatations of the latter.

Fig. 4.

A portion of healthy hyaloid membrane, taken from near the optic disc, and showing the surface next the vitreous chamber.

(1.) A fold of hyaloid membrane.

(2. 2. 2.) Transparent filaments, projecting from the hyaloid membrane; their extremities, after separation from the rest of the filaments, appeared enlarged.

Figs. 5, 6, 7, 8.

Portions taken from the fibrous part of "*Cancer*" *of the choroid*, showing in Fig. 5 fibres, from which shoot out excrescences filled with nuclei; in Fig. 6 connective tissue corpuscles; in Fig. 7 tubes filled with cells containing granules; in Fig. 8 cells of various sizes filled with granules.

Fig. 9.

Section of a portion of retina and vitreous substance, one quarter of an inch inwards from the (deeply cupped) optic disc, from an eye the sight of which had been destroyed by Chronic Glaucoma.

(1.) Vitreous substance.

(2.) Spot where the "vitreous" touches the part of the retina occupied by the granules. The optic nerve fibres and ganglion cells have completely disappeared.

(3.) More healthy looking granules.

(4.) Transversely cut fibres of the connective tissue of the retina.

(5, 6.) Fibres of connective tissue ("radial fibres"). These fibres

are thinner than in the healthy retina, become more indistinct near the vitreous, and many project into it.

PLATE II.

Fig. 1.

Section of a portion of retina one-quarter of an inch inwards from the (deeply cupped) optic disc, from an eye, vision of which had been destroyed by Chronic Glaucoma.

(1.) Vitreous substance attached to the retina.

(2.) Fibre of connective tissue. The connective tissue fibres, the course of which can still be recognized, are abnormally thin and ill-defined.

(3.) Traces of the outer membrana limitans.

(4, 5.) Granules.

The optic nerve fibres, the ganglion cells, and the rods and bulbs have disappeared.

Fig. 2.

Portion of vitreous substance (× 500) from an eye suffering from Acute Glaucoma. The vitreous substance appeared greyish, semiopaque. It was taken from near a large blood spot in the retina, and consisted of semiopaque and of transparent filaments (as seen in the healthy vitreous substance) mixed up with few granule cells.

Fig. 3.

Portion of retina viewed from the surface next the vitreous chamber from an eye suffering from Chronic Glaucoma.

(1.) Peculiar large globules, situated in the retina, seen through the layer of (?) optic nerve fibres.

(2.) Blood-vessel of the retina.

(3.) (?) Optic nerve fibres.

Figs. 4, 5, 6.

Varieties of blood-vessels, probably veins, and peculiar globes (× 200) found in the glaucomatous retina, of which Fig. 3 represents a portion.

Fig. 4. A vein, showing (1.) Abnormal dilatations. The inner coat of the vein is missing over the most dilated portions.

(2.) A less enlarged portion of the vein, in which the inner and outer coats can be recognized.

Fig. 5.

Several smaller veins merging into a large one.

(1.) Enlarged portion.

(2.) Large globe situated in (?) an unequally dilated vein.

(3.) Large globes. Of these many could be seen in different parts of the retina. On section they were found to be lacunæ among the connective tissue, occupied by some peculiar substance.

Fig. 6.

A similarly dilated vein.

Fig. 7.

The outline of a myopic eye (natural size); showing the oval or egg-shape, and an unusually bulging portion near the optic nerve in the region of the yellow spot (so called Staphyloma Posticum).

Fig. 8.

The outline of a myopic eye on section (natural size).

(1.) Crystalline lens (opaque and chalky) in contact with the iris and cornea.

(2.) Vitreous chamber.

(3.) Displaced hyaloid membrane.

(4.) Space between the former and the retina (occupied by fluid).

(5.) Region of yellow spot. The tunics (retina, choroid, sclerotic) of this region (through carelessness of the lithographer) have been represented too thick. (See Figs. 9, 10.)

(6.) Optic nerve.

Fig. 9.

Two parallel lines indicating the conjoined thickness of retina, choroid,

and sclerotic in the region of the yellow spot of the eye, the outlines of which are represented in Fig. 8.

Fig. 10.

Two parallel lines indicating the conjoined thickness of the retina, choroid, and sclerotic in the equatorial region of the eye, represented in Fig. 8.

Fig. 11.

Round and angular yellowish transparent granules, found in the fluid which occupied the space between the retina and displaced hyaloid membrane of the eye represented in Fig. 8.

Fig. 12.

Capillary vessels (× 350) *of the retina of a myopic eye.*

(1.) Black pigment granules and fat globules. These occupied some parts of the vessels, in others blood corpuscles were visible.

Fig. 13.

A healthy capillary vessel of the retina (× 270).

Morbidly altered retinal capillaries are represented (× 270) in Figs. 14, 15, 16, 17, 18.

Fig. 14.

From a suppurating retina.

(1.) Unequally dilated capillary vessels.

(2.) (?) "Colloid globes."

Fig. 15.

From an atrophic retina.

(1.) Unequally dilated capillary vessel.

(2.) Black pigment spot.

The pigment spots were found beneath the hyaloid membrane, upon the vessels of the retina.

Figs. 16, 17, 18.

Capillary vessels from different parts of the same atrophic retina.

Fig. 16.

Two unequally dilated capillary vessels.

Fig. 17.

A capillary vessel wiih "hypertrophied" walls.

Fig. 18.

A capillary vessel sprinkled with pigment granules.

PLATE III.

Fig. 1.

From an atrophic retina.

(1.) An unequally dilated large retinal blood-vessel and capillaries.

A ligature was placed tightly round the optic nerve previous to excision, so as to prevent escape of blood from the retina. The capillaries, after escape of blood, appeared as a close net-work of fibres.

Fig. 2.

Section of retina (about a quarter of an inch from the upper margin of the optic disc) from an eye, vision of which had been lost by syphilitic choroido-retinitis.

(1, 4.) Elastic lamina of the choroid.

(2.) Fibres of connective tissue of the retina.

(3.) A cluster of fat globules and of granules among the connective tissue. Numerous similar clusters were found among the connective tissue of other parts of the same retina. None of the elements of the retina, except the connective tissue, could be recognized. The clusters of fat globules in the retina appeared most numerous near the choroid.

Fig. 3.

Section of another retina, showing the effects of syphilitic inflammation.

(1, 2.) Fibres of connective tissue of the retina.

The fibres anastomose freely with each other and form a close network; the lacunæ between the fibres were occupied by fluid; no granules were perceptible.

(3.) Clot of blood in the choroid.

(4.) Elastic lamina of the choroid.

Figs. 4, 5.

Peculiar-shaped, narrow, square, and vertically notched, upper central permanent incisor teeth, from persons suffering from inherited syphilis.

PLATE IV.

Fig. 1.

"*The cataract knife.*" (The blade of the knife should gradually increase in thickness from the point to the heel, and should, while passing, e. g. through the aqueous chamber, not allow any aqueous humour to escape.)

Fig. 2.

"*The bent lancet-shaped knife.*" This knife should increase in thickness from point to heel, like the cataract knife. The cutting edges, from the bend to the spot where they commence to converge towards the point, should be parallel with each other. An incision made with this part of the knife is equally wide throughout.

Of the lancet-shaped knife different sizes are in use. Fig. 2 represents the middle size of the bent one. The largest size is used for extraction of cataract, the smaller sizes for artificial pupil, iridectomy, &c.

To the left of Fig. 2 is shown a side view of the bent lancet-shaped knife.

Fig. 3.

"*The broad needle.*" The edges of the needle are sharp from the point to within half an inch from the heel.

Fig. 4.

"*The cataract needle.*" The needle should be so constructed as to pass

easily through the cornea; it should retain the aqueous humour thoroughly while manipulating.

Fig. 5.

"*The iris scissors.*" Occasionally a pair is employed with only one point blunt, and the other sharp.

Fig. 6.

"*The strabismus scissors.*" The blades should be strong and blunt-pointed.

Fig. 7.

"*The curved scissors.*" They should be blunt-pointed, strong, and bent on the flat.

Fig. 8.

"*The curette*" (b) *and* "*pricker*" (a). The pricker, Fig. 8, a, is used for opening the capsule of the lens in the operation for cataract.

Fig. 9.

"*The scoop.*" The scoop (a) (by some termed *tractor*) is the second of three different sizes which are in use in operations for cataract.

The body of the scoop is slightly concave from the stem towards the bent end, and still less concave from side to side. At the bent end it has an elevated edge, which forms an obtuse angle with the body. The scoop (b) is smaller, and has a more elevated edge than (a). It is used for the removal of small hard particles of cataract.

The scoop should be as thin as is compatible with use, and should be made of somewhat flexible material.

Fig. 10.

(a) "*The blunt iris-hook,*" *and* (b) "*the spatula.*" Both are made of flexible material.

A sharp flexible hook, of equally short but less acute bend than the iris-hook, is used for removal of "opaque capsule" and of hard cataract.

Fig. 11.

"*The strabismus-hook.*"

Fig. 12.

"*The iris forceps.*" The blunt points (a and b) of the blades of the forceps should remain in contact with each other when pressure is made to bring those portions of the surfaces in contact, which extend from the points to within a quarter of an inch from them.

Iris forceps are made with blades of varying degrees of curvature; the surfaces near the points may be roughened or smooth; or the points may be toothed.

The points of the forceps used for fixing the eyeball during operation should be toothed. Each tooth should be sharp, and almost in a line with the blade, if the forceps are used for grasping the sclerotic.

Fig. 13.

"*The compressorium forceps.*" The solid blade (a) has to be passed beneath the eyelid (upon the conjunctiva), and the blade (b) upon the skin of the eyelid. The screw (c) serves to maintain pressure of the blades against each other.

Fig. 14.

"*The stop speculum.*" This instrument is used for keeping the eyelids open. The spring of the wires of the speculum can be regulated by the screw (a).

A very light stop speculum, made of thin wire, is employed during extraction of cataract, and during operations on glaucomatous eyes.

PLATE V.

Fig. 1.

The optic disc and the immediately adjoining retina, choroid, and sclerotic, of the healthy left eye of a person aged 20, with blue irides.

The round optic disc is represented near the centre of the figure. At its outer and inner margin it is skirted by a crescentic patch of brown

pigment (an accumulation of pigment granules level with the hexagonal cells); this is sometimes observed in healthy eyes. The middle of the optic disc has a whitish, the rest a brilliant pink colour (the disc in the figure is too red). The whitish portion is solely occupied by opaque white connective tissue, which surrounds the blood-vessels where they pass through the optic disc. The bundles of optic nerve fibres occupy the pink portion of the disc.

All the blood-vessels of the retina pass in and out through the optic disc, and from it diverge into the retina (the larger number branch towards the left side in the direction of the region of the yellow spot). The brilliant red colour, which surrounds the optic disc, is caused by the light of the ophthalmoscope (reflected from the white inner surface of the sclerotic), having to pass through the transparent blood-carrying vessels of the choroid.

Fig. 2.

The same parts as represented in Fig. 1, from a hypermetropic person aged 20, with brown irides.

The optic disc (in the middle of the figure) is oval-shaped; a peculiarity which is often observed in hypermetropic persons with convergent strabismus.

The numerous blood-vessels of the retina diverge from the optic disc. The veins are somewhat tortuous, as is often seen in young asthenopic hypermetropics.

Many of the vessels appear bulged forwards towards the vitreous chamber, at the spot where they pass from the optic disc upon the retina; this appearance is peculiar to hypermetropics.

The grey red colour of the rest of the figure is caused by the light (reflected from the sclerotic) having to pass through the more highly-pigmented vascular choroid.

Fig. 3.

The same parts as represented in Fig. 1, of a hypermetropic negro, aged 28, with "black irides."

The centre of the oval-shaped optic disc has a brilliant white, the rest a delicate pink colour.

The disc appears particularly well-defined, owing to the contrast of colour between it and the choroid.

The abundance of colouring matter in the pigment cells and granules of the choroid gives the latter the dark bluish brown colour.

The little light which reaches the sclerotic, and returns from it across the strongly-pigmented choroid, causes the blood in the vessels in the retina to appear dull red; while in the optic disc the blood has a brilliant red colour through the light returning from the white and opaque connective tissue of the optic nerve. The contrast in colour between the arteries and veins of the retina is well marked.

Fig. 4.

The region of the yellow spot, with the yellow spot in the centre, of an eye with blue iris (from a person aged 20).

The bluish rim represents the iris under the influence of atropia.

In the middle of the red surface of the figure is a yellowish white ring, which represents the image of the metal frame of the ophthalmoscope used in the examination.

This image is circular only round the yellow spot. It is not represented in the yellow spot of the other eyes.

In the centre of the ring is the yellow spot itself, which appears as a minute red dot, shading off into the surrounding parts.

Fig. 5.

The region of the yellow spot and the yellow spot itself, of a person, aged 20, with brown irides.

The brownish rim represents the iris; in the centre of the brown-red surface we observe a grey-brown ill-defined spot; this is "the yellow spot."

Fig. 6.

The region of the yellow spot, and the yellow spot itself, of a person, aged 20, with black irides.

The brownish-black rim represents the iris; in the centre of the surface surrounded by it we see a black dot—"the yellow spot." The

grey-blue halo, adjoining it, is the region of the yellow spot (this halo is represented too light in the figure).

PLATE VI.

Fig. 7.

Anæmia of the optic disc and of the retina, with traces of atrophy in the choroid, near the margin of the optic disc.

The round optic disc occupies the centre of the figure. The middle of the disc appears white, being occupied by fibrous tissue only, the rest bluish-white and opaque; this colour is the conjoint effect of transparent optic nerve fibres, and of semiopaque connective tissue.

The retinal veins and arteries, in the transparent retina, as well as in the optic disc, are extremely thin, and appear less numerous than in health.

In the choroid, to the right of the optic disc, is a yellowish opaque irregular patch, which is probably the result of atrophy of a circumscribed portion of choroid. The choroid has a pale red colour throughout; this, considering the diminished blood supply to the retina and the less saturated pigment of the choroid, may be attributed to anæmia of the choroid.

(Anæmia of the optic disc, and of the tunics, has been observed in both eyes after great loss of blood.)

Fig. 8.

Anæmia and atrophy of the optic disc, and slight anæmia of the retina.

Left eye. The optic disc and the tunics immediately adjoining it.

The optic disc, situated in the middle of the figure, appears white in the centre (which is occupied by connective tissue only); the rest of the disc is bluish-white and opaque. The disc is surrounded by a somewhat irregular white rim of sclerotic (the inner edge of the sclerotic aperture). The disc, as to colour, resembles the one observed in chronic glaucoma (see Plate IX. Fig. 29), but differs from it in the complete absence of signs of pressure in the retinal vessels in its area.

An extremely thin retinal artery, and a comparatively large number of irregularly-dilated retinal veins, pass through the optic disc. (It may

be that atrophic changes of the optic nerve prevent the free return of blood from the retina, and give rise to the varicose condition of its veins.)

The retina is transparent. The brownish irregular-shaped defined patches are situated beneath the retina, and represent groups of stellate pigment cells of the choroid (their shape is not correctly represented). The blood in the choroid (the brilliant red colour in the figure) and in the retinal vessels has a peculiar cherry-red tint, which has repeatedly been observed with this state of the optic nerve.

This form of anæmia and atrophy of the optic disc occurs, as a rule, in both eyes, and is observed in amaurosis from cerebral causes, and especially in the form described as "Tobacco amaurosis."

Fig. 9.

Inflammation of the optic disc. The swollen optic disc. Neuritis optica.

Right eye. The optic disc and the tunics immediately adjoining it.

The oval-shaped optic disc occupies the middle of the figure. Its centre appears white, the rest greyish-white, opaque, and unusually projecting (towards the vitreous chamber). The margin of the disc is slightly ill-defined; it shades off—and more so in some places than in others. This appearance of the optic disc is caused by swelling of its connective tissue.

Many of the retinal blood-vessels are lost sight of, others are less distinct where they pass from the optic disc upon the retina; some are unusually bulged forwards, like the surface of the disc.

The arteries and veins appear numerous. Many of the latter are tortuous and much enlarged in the retina (probably through the return of blood from the retina into the optic disc being somewhat impeded by the swelling, &c., of the disc). The blood-vessels appear thin in the disc itself.

The retina and choroid round the optic disc appear healthy.

The stage of acute inflammation of the optic disc, as represented in Fig. 9, is preceded by hyperæmia and followed by atrophy. In all cases, hitherto observed, the change of the optic disc appeared in both eyes, with grave cerebral disturbances (as a rule, with tumour at the surface of the cerebellum.)

Fig. 10.

The region of the yellow spot, showing the appearance observed during syphilitic choroiditis.

(This form of choroid inflammation has by some been termed choroiditis disseminata, from the foci of inflammation ("lymph nodules") being separated from each other by apparently healthy portions of choroid).

The roundish, yellow, tolerably well-defined spots (seven in number) represent nodules of lymph situated in and upon the choroid.

The groups of black and brown spots of pigment, situated upon and surrounded by light yellow portions of choroid (one of which is represented in the middle of the figure), are portions of choroid in a state of atrophy. The atrophic portions of choroid shade off into more vascular ones.

The group of pigment spots in the middle of the figure occupies the part of the choroid which subtends the yellow spot of the retina. Similar groups, termed atrophic patches, are expected to appear where the lymph nodules are visible at present.

Branching over the choroid, we observe a few thin, unequally dilated blood-vessels of the retina. Their distribution, calibre, and number at the region of the yellow spot is not quite in accordance with health, and indicates a participation of the retina in the morbid changes of the choroid.

Towards the right of the figure is represented a large blood-vessel of the choroid, running through a yellowish atrophic portion of that tunic, and disappearing beneath a group of pigment spots.

Fig. 11.

Chronic "syphilitic" inflammation of the choroid and retina (Inherited syphilis.)

The optic disc and the tunics immediately adjoining it.

The optic disc (represented in the middle of the figure) has a yellowish turbid colour. It appears very ill-defined, through the adjoining retina and choroid having likewise lost their transparency. The few blood-vessels which pass from the optic disc into the retina are extremely thin. They are lost sight of in some parts of the retina; in

others they appear unequally dilated. The brownish and the black spots near the optic disc, and in other parts of the figure, represent accumulations of pigment in and upon the choroid.

(The optic disc, as regards colour, indistinctness of outline, and scarcity of blood-vessels, resembles very much in appearance the one observed in the patient from whom Fig. 10 was taken. Vision of the eye, from which Fig. 11 was taken, was very defective, and some portions of the retina were much more sensitive than others. The patient, among other symptoms characteristic of inherited syphilis, had had syphilitic corneitis in both eyes. In the right eye the deeper parts (choroid, retina, &c.) had completely escaped inflammation.

Fig. 12.

Inflammation of a portion of the choroid, retina, and vitreous substance, in the region of the yellow spot. (The figure has been by mistake printed upside down.)

The grey-white and opaque portion, occupying nearly half of the figure, appears ill-defined, and shades off into the transparent retina, and into the normal "red" choroid. The opaque portion represents the "inflamed" choroid and retina.

A few patches of capillary vessels, some minute blood spots, and many unequally dilated large vessels, are distributed over the inflamed portion. The vessels of the retina near it are much larger and tortuous. Grey-white and opaque flocculi are visible in the vitreous chamber adjoining the focus of inflammation.

PLATE VII.

Fig. 13.

Hyperæmia of the optic disc and of the retina, with inflammation of portions of the choroid, retina, and vitreous substance in the region of the yellow spot. The greater part of the region of the yellow spot is represented in Plate VI. Fig. 12.

The optic disc occupying the middle of the figure appears nearly as red as the adjoining choroid. The veins of the retina are tortuous

and enlarged. Near the seat of inflammation appears the retina œdematous ; its transparency is slightly impaired.

To the right of the optic disc, at the margin of the figure, are seen the inflamed retina and choroid (more fully represented on Plate VI. Fig. 12).

Fig. 14.

The region of the yellow spot, represented in a later stage of the form of inflammation, shown in Figs. 12, 13.

Near the middle of the figure are represented groups of black pigment molecules. The brilliant yellowish-white and opaque portion beneath and round these is a portion of choroid and retina altered by inflammation.

Dissection showed that the yellowish reflection was in this instance caused, not by the sclerotic, viewed through transparent and atrophic choroid, but by the choroid and retina ; these had become changed into a thick yellowish-white and opaque substance.

Two blood-vessels of the retina are represented passing across the figure. The one, which is unequally dilated and tortuous, runs in the altered portion of the retina itself.

Fig. 15.

Extreme hyperæmia of the optic disc. (This is the fellow disc to the one shown in Figs. 16, 17.)

A narrow rim of the tunics is represented adjoining the disc.

In the centre of the optic disc we observe a black spot, surrounded by a small white one. The latter is an appearance often observed in healthy eyes, and is caused by white connective tissue, which surrounds the large blood-vessels, and separates them from the bundles of optic nerve fibres. The black spot is supposed to be a peculiarity produced by reflection of the light.

This optic disc appears almost as red as the adjoining choroid. It is normal as regards the shape and the transparency of the optic nerve fibres and the vessels of the retina.

Fig. 16.

Inflammation of the greater part of the optic disc, and of a portion of the choroid and retina adjoining it.

The grey-white and opaque part, in the middle of the Figure, represents the inflamed optic disc, which towards the right and downwards is seen to merge into an oval-shaped portion of the same colour, being the inflamed part of the retina and choroid. A narrow strip of healthy retina and choroid is represented round the opaque part.

The blood-vessels appear more or less indistinct in the inflamed optic disc.

Two thin blood-vessels, passing into the inflamed part of the retina, &c., are lost sight of in some, and appear thin and ill-defined in other places, while on reaching the healthy retina they again appear natural.

Fig. 17.

The optic disc, &c. (of Fig. 16), *represented after all inflammation had subsided.*

The optic disc, occupying the middle of the figure, still appears greyish-white and opaque (anæmic). (It continued so for 18 months after this drawing had been made.)

The retinal blood-vessels can be traced into the disc from all sides.

To the right and downwards from the optic disc we observe a group of brownish-black pigment spots upon a yellow patch; this indicates an atrophic condition of the previously inflamed parts. (Judging from the state of vision, the retina was destroyed at the atrophic part.)

Fig. 18.

Extreme anæmia with atrophy of the optic disc, and of the tunics adjoining it (*described by some as Retinitis pigmentosa*).

The optic disc occupies the middle of the figure. Its centre appears white, the rest grey-white and opaque.

The blood-vessels of the retina which pass through the disc, are extremely thin, unequally dilated, and few in number. At some distance from the disc, in the retina, they are hardly perceptible.

The "retina" appears transparent. Beneath it we observe a net-

work of light yellow lines. These are the nearly empty transparent veins (vasa vorticosa) of the choroid.

The irregular-shaped greyish patches intervening between the veins of the choroid, represent groups of stellate pigment cells.

These groups, as regards their shape, are normal, and care has been taken to represent their shape correctly.

In health their colour varies (in the merely anæmic choroid) between a light and a dark brown, or nearly black.

The few black patches to the right of the optic disc, somewhat resembling bone corpuscles in shape, are supposed to be groups of pigment granules, derived from hexagonal cells, and to be situated some in, some beneath the retina.

PLATE VIII.

Fig. 19.

The region of yellow spot of the eye, of which Plate VII. Fig. 18 represents the optic disc, &c.

The shape of the groups of stellate pigment cells represented in the figure is different from those shown in Plate VII. Fig. 18. The red colour, occupying about two-thirds of the figure, is attributed to blood circulating in the veins and capillaries of the choroid.

To the right (over the more anæmic portion of the choroid) we see a thin vessel of the retina, and to the left a few black pigment spots of the same kind as described in Plate VII. Fig. 18.

Fig. 20.

Anæmia with atrophy of the retina and choroid.

A portion of the retina, choroid and sclerotic from the upper equatorial region of the eye.

The brownish-black spots represent groups of pigment granules from hexagonal cells, and the grey oblong patches groups of stellate pigment cells.

The turbid brown red colour, represented in the figure towards the right and left of the groups of stellate pigment cells, is caused by the

semiopaque "retina." A thin unequally dilated blood-vessel of the retina is seen passing across the figure near the lower third.

Figs. 18, 19, 20 represent an advanced stage of what is termed Retinitis pigmentosa.

Fig. 21.

Myopia, "short sight." (From the right eye of a person with blue irides.)

The optic disc and the retina, choroid, and sclerotic immediately adjoining it.

The optic disc near the middle of the figure is oval-shaped, the long axis of the oval being vertical. The centre of the optic disc is whitish, the rest pink. The disc is completely surrounded by a white figure. (This figure has in most Myopics a crescentic shape, and is termed the "crescent," or "crescentic atrophy." It generally skirts that margin of the optic disc which lies nearest the yellow spot.)

The largest portion of the white figure lies on the side nearest the yellow spot; a narrow rim of white also intervenes between the rest of the margin of the optic disc and the vascular choroid.

The choroid adjoining the crescent appears pale red, it is slightly atrophic, and gradually goes over into healthy choroid.

The blood-vessels of the retina are normal as regards size and number. Those which pass over the white figure follow the abnormal curvature of the tunics; they appear to bend forwards towards the vitreous chamber, where they pass from the "white" on to the "red" portion of the figure.

Fig. 22.

Myopia. Right eye of a person with brown irides.

The optic disc with a small portion of the retina, choroid, and sclerotic adjoining it.

The optic disc has a pink colour, and appears oval-shaped, with the long axis of the oval vertical. The white figure which surrounds the optic disc has not a crescentic but an irregular shape, as is often observed in extreme myopia.

The brown line which skirts the greater part of the white figure, is

caused by accumulation of pigment of the choroid. The light brown patches in the pale pink portion of the choroid next this line of pigment, represent groups of stellate pigment cells in the otherwise anæmic and somewhat atrophic choroid.

The bending forwards of the retinal vessels, where they pass from the white figure upon the brown line of pigment, is well marked.

Fig. 23.

Atrophy of the choroid and retina. (By some described as choroiditis pigmentosa, by others as retinitis pigmentosa.)

A portion of the retina, choroid, and sclerotic, from the outer equatorial region, as it appeared after removal from the eyeball. From a myopic person.

The numerous small, somewhat star-shaped, black spots were situated upon the choroid, on a level with the part occupied in health by the hexagonal cells.

The retina, to the naked eye, appeared transparent. On drawing it away from the choroid many of the black spots remained attached to it.

The brown elongated patches, separated from each other by light yellow lines, represent groups of stellate pigment cells of the choroid; and the intervening yellow lines represent the empty transparent veins of the choroid.

The groups of stellate pigment cells along the lower margin of the figure appear as pale brown ill-defined patches; here the pigment cells were found most atrophic.

Fig. 24.

Atrophy of a portion of the choroid and retina adjoining the optic disc.

The optic disc, occupying the middle of the figure, has a light pink colour.

The veins of the retina appear numerous, large, and unequally dilated. The optic disc is surrounded by a yellowish white, defined, irregularly-shaped figure, which, to the right of the disc, extends across the figure. This figure represents the atrophic part of the choroid, which on dissection was found to be semiopaque and subtended by the sclerotic.

The two black spots (a large and a small one) to the right of the

optic disc were found to be situated upon the choroid, beneath the retina.

The small, round, yellowish white dot in the centre of each of the black spots is caused by the sclerotic shining through the atrophic transparent choroid.

The choroid immediately adjoining the atrophic portions is hyperæmic, while in most other parts it is more or less atrophic; e. g. to the left of the optic disc we observe a group of red and pink patches; the latter are supposed to be portions of choroid in a state of commencing atrophy.

PLATE IX.

Fig. 25.

The region of the yellow spot of the eye from which Fig. 24 *is taken.*

The brilliant white, yellowish-white, and pale pink patches were found to be more or less transparent atrophic portions of choroid, subtended by white sclerotic, and covered by transparent retina.

The transition from the healthy to the atrophic portion of choroid is abrupt along the upper margin of the white patch, and shades off gradually at its lower margin.

The blood-vessels which pass across the white patch belong to the retina. The latter, though transparent over the patch, was found adherent to it, and its minute structure much altered.

The atrophic changes of choroid and retina, represented in Figs. 24, 25, were the results not of distension of the tunics, as in myopia, but of inflammation.

Fig. 28.

(*Left eye.*) *The optic disc, with a narrow strip of the tunics adjoining it, of a person suffering from acute glaucoma of the fellow eye.*

Fig. 27.

The optic disc with the tunics immediately adjoining it, as it appeared 24 *hours after an attack of acute glaucoma.*

In Fig. 26 we see the same optic disc, &c., represented three days after iridectomy had been performed on the eye.

In Figs. 26, 27, 28 we observe a narrow white ring which intervenes between the margin of the optic disc and the vascular part of the choroid, and which is well defined next the optic disc, but shades off into the vascular part of the choroid. It is often observed in glaucoma.

The optic disc in Fig. 28 appears hyperæmic.

Changes peculiar to increased tension of the eyeball were observed especially in the smaller veins of the retina; these appeared thinner in the optic disc, and where they passed over the white rim, than in the retina.

Fig. 27.

Fig. 27 *represents the change in colour of the optic disc, and the disturbance in the circulation of the blood in the blood-vessels of the retina, where they pass through the disc, as the result of sudden and greatly increased tension of the eyeball.*

The optic disc appears anæmic (pinkish-white) in the centre, the rest of it bluish-white and opaque. The red rim surrounding the disc represents the vascular choroid, upon which we see the veins of the retina gorged with blood; upon the white rim and in the optic disc itself are the retinal vessels more or less empty, and scarcely traceable.

The optic disc (after iridectomy), in Fig. 26, has a more uniform pinkish-grey and opaque colour. A striking change has occurred in the retinal blood-vessels, which pass through the disc, compared with those represented in Fig. 27. The numerous full veins of the retina are seen passing uninterruptedly from the retina into the optic disc.

The retinal arteries, though more numerous, appear nearly as thin as they did before the iridectomy. The white rim round the optic disc appears hardly altered.

Fig. 29.

Left eye. The optic disc and the immediately adjoining retina, choroid, and sclerotic, from a person suffering from glaucoma in both eyes.

The optic disc represented in the middle of the figure appears well-defined, and has a greyish-blue colour most marked in the left half of the disc (the one nearest the yellow spot).

The choroid as regards colour appears somewhat anæmic.

(The retina appeared less transparent in some than in other parts.)

The veins of the retina appear full and tortuous, except in the optic disc. The retinal arteries are few in number and thin.

The changes in the arteries and veins of the retina observed at the margin of the optic disc, and in the area of the disc, are characteristic of long-continued increase of tension of the eyeball. On more careful examination, e. g. of the veins which from the lower margin of the figure pass through the retina towards the optic disc, we observe that the veins in the retina are tortuous and filled with blood, while in the optic disc, and where they pass over the white narrow rim which surrounds the disc, they appear thin and nearly empty.

The anomalous course of the vessels, where they bend *round* the margin of the optic disc, is not quite correctly represented in Fig. 29. In glaucoma of long standing the veins of the retina bend round the margin of the optic disc, and if the margin be unusually prominent they are lost sight of for some distance. This causes the portions of the veins in the optic disc to appear as if they were not the continuations of those in the retina. This change in course and apparent calibre, is visible more particularly in the veins which pass over the lower margin of the disc.

Fig. 30.

Left eye. Hæmorrhage into the retina.

The optic disc and the tunics immediately adjoining it.

From a myopic person, whose optic disc, &c., of the fellow eye is represented in Plate VIII. Fig. 21.

The optic disc is masked by blood spots, and by swelling and impairment of transparency of the retina. The position of the optic disc can be inferred from the course of the retinal vessels, which converge towards and meet in the disc.

The blood spots are unusually large and numerous; into many we can trace the blood-vessels (? arteries) of the retina.

PLATE X.

Fig. 31.

Choroido-retinitis with numerous blood spots and yellow spots in the retina, "Retinitis apoplectica."

Observed in persons suffering from Albuminuria.

The yellowish-pink optic disc is represented in the middle of the figure. (Swelling and loss of transparency, &c., of the retina and choroid cause the optic disc to appear at first ill-defined, somewhat resembling the one in Plate VI. Fig. 11. Gradually it became more defined, as shown in Fig. 31.)

The yellow spots are those which are more particularly observed with retinitis appearing during albuminuria, and especially during Bright's disease. These spots are seated some in the retina, some in the choroid, and by preference round the optic disc and in the region of the yellow spot.

A large oval-shaped yellow spot of this kind is represented to the right of the optic disc, and two are seen surrounded by blood spots, near the lower margin of the disc.

(The spots examined minutely consisted of an agglomeration of semi-transparent yellowish granule cells.)

The blood spots are very numerous; some have a striated appearance (yellowish and red streaks standing side by side),—others surround the yellow spots.

The blood-vessels of the retina are unequally dilated, tortuous, and varicose. Long tracts of the walls of some of the vessels seem to have given way. Some of the vessels are lost sight of in the blood spots, others can be traced beyond.

(The appearance of the blood spots is, in many cases, preceded by hyperæmia of the retina, and in most it is followed by well-marked retinitis.)

Fig. 32.

Left eye. The region of the yellow spot.

Intraocular hæmorrhage.

The peculiarity of this case was that instead of a red reflection being

obtained on ophthalmoscopic examination from behind the pupil, the appearance represented in Fig. 32 was observed.

(From dissection of an eye, in which a similar appearance was observed before excision, it is inferred that the appearance represented in Fig. 32 is the result of hæmorrhage from a blood-vessel of the strongly-pigmented choroid. The blood was effused between the choroid and sclerotic; it also perforated the retina and escaped into the vitreous chamber.)

Fig. 33.

A view taken two years later of the parts of the eye represented in Fig. 32.

The oval-shaped black patch in the middle of the figure represents an accumulation of pigment upon the choroid round a greenish-white atrophic portion. The hæmorrhage is supposed to have proceeded from this spot. The choroid (the red surface) adjoining it is more or less atrophic, and gradually shades off into more vascular choroid.

In the lower part of the figure we observe a thin blood-vessel of the retina.

Fig. 34.

"*Displaced retina.*" *Left eye.*

The optic disc and the sclerotic choroid and retina immediately adjoining it.

The yellowish pink optic disc occupies the middle of the figure. Near its margin and adjoining it we observe a part which has an opaque greyish-white colour.

(Slight movements of the eyeball produced an undulating movement of this opaque part, and of the blood-vessels in it.)

The rest of the figure has a pinkish-grey colour.

We notice an alteration of the colour of those blood-vessels of the retina, which from the optic disc go upwards, and which are distributed in the grey-white and opaque part. The vessels, instead of appearing red, as they do over the pinkish part, appear as black undulating lines. This change in colour is accompanied by alterations in the course and width of the blood-vessels. The latter appear larger, and no longer on a level

with the red portions of the vessels. The red vessels disappear beneath the margin of the grey and opaque substance.

Along the lower margin of the optic disc we observe a slight deviation of the retinal vessels at the spot where they pass from the retina into the optic disc: also in this part of the retina the vessels have an abnormally dark-red colour.

We infer from the alteration in the course, colour, and width of the retinal blood-vessels that the attachments of the retina to the choroid have become loosened by effusion of fluid between the choroid and retina.

Fig. 35.

Anæmia and atrophy of the optic disc and the retina.

The optic disc and the tunics immediately adjoining it.

The pale bluish-white and opaque optic disc occupies the middle of the figure. Two thin blood-vessels (veins) pass through the disc, and disappear close to each other near its outer margin.

A narrow white crescentic ring of sclerotic is seen skirting the margin of the optic disc.

From the turbid red colour round the optic disc, we infer the choroid to be morbidly altered (? inflamed).

The blood-vessels in the retina are few in number, thin, and unequally dilated. At the margin of the optic disc they appear particularly thin, and bend round the margin of the optic disc, as if the latter was somewhat cupped. In the retina the vessels are unequally dilated and very indistinct in some parts, as is often seen in the later stages of choroido-retinitis.

Fig. 36.

Chronic choroido-retinitis. Left eye.

The optic disc and the tunics immediately adjoining it.

The optic disc occupies the middle of the figure. Its position can only be recognized by three extremely thin blood-vessels of the retina which meet in the disc.

The dirty brownish-red colour of the figure is attributed to products of inflammation, especially in the choroid and in the connective tissue of

the optic disc. The impairment of transparency and change in colour of the choroid, retina, optic disc, and of the adjoining vitreous substance are the results of chronic inflammation.

Fig. 35 represents a later stage of the form of inflammation represented in Fig. 36.

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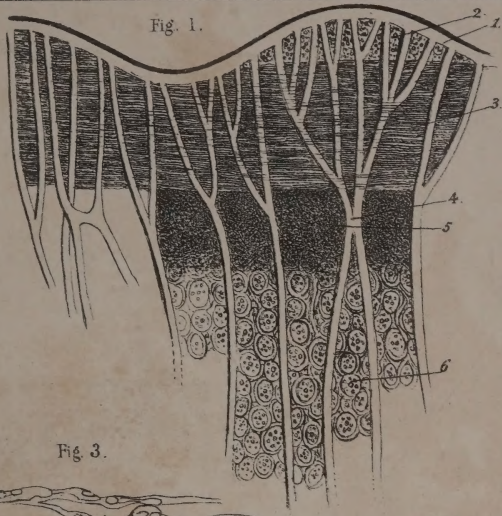

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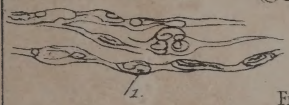

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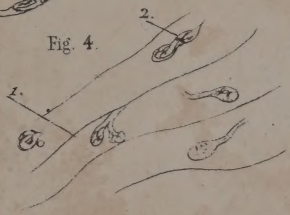

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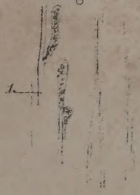

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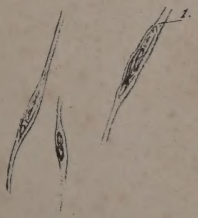

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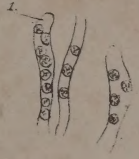

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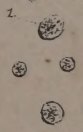

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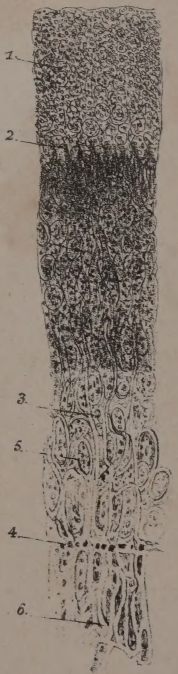

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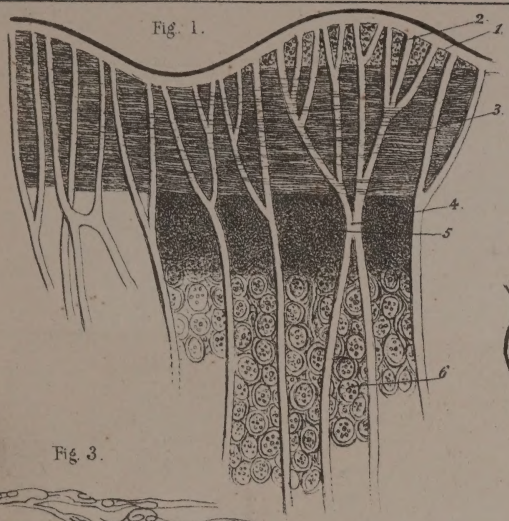

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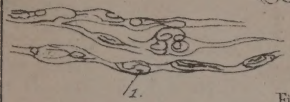

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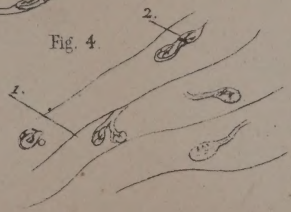

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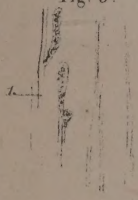

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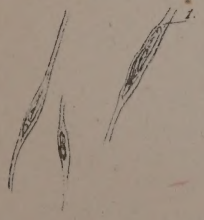

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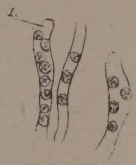

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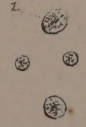

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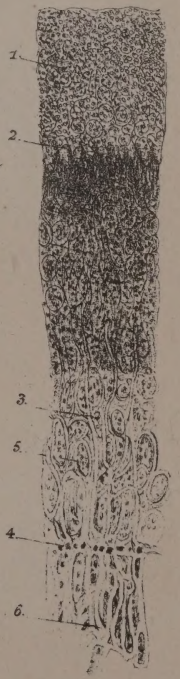

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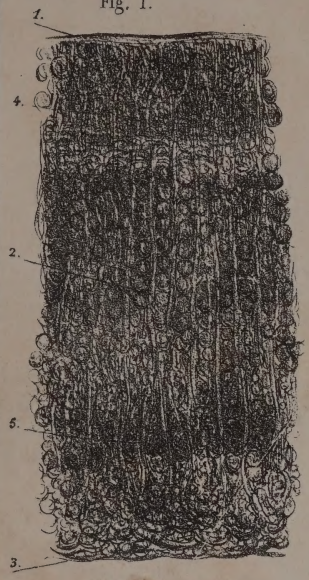

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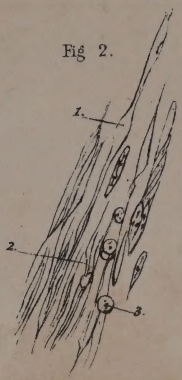

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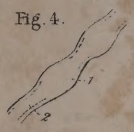

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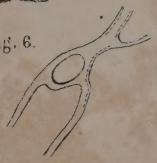

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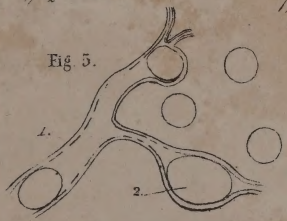

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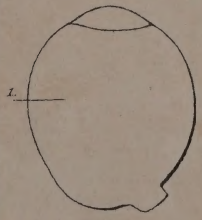

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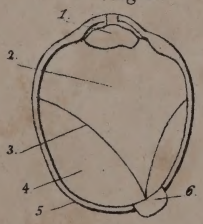

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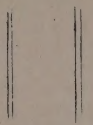

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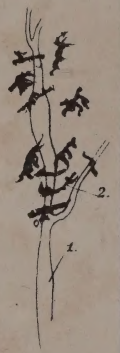

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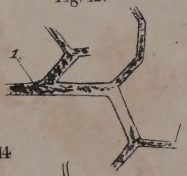

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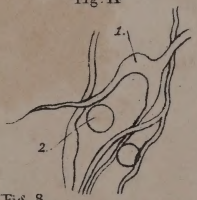

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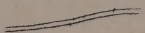

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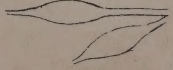

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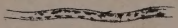
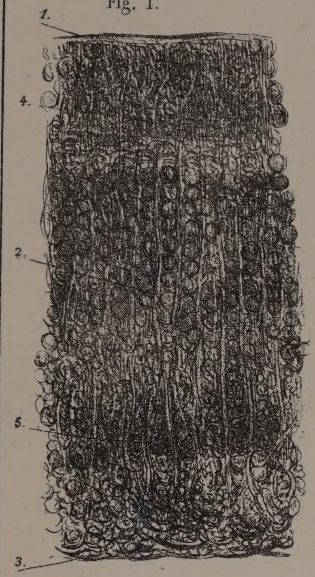


C. Bader. del. J. Erxleben, lith. Day & Son, Lithographers to the Queen.

Fig. 1.



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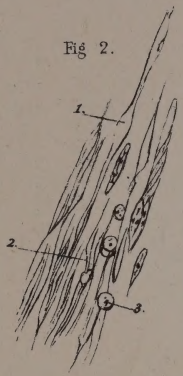


Fig. 3.

Fig. 9. Fig. 10

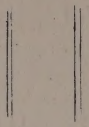
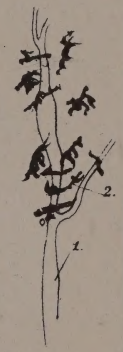


Fig. 11.

Fig. 15.



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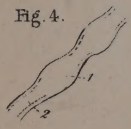

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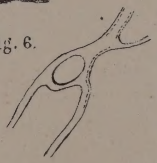

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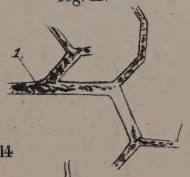

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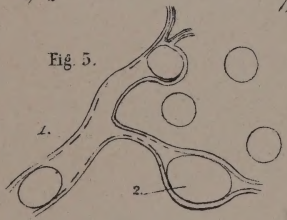

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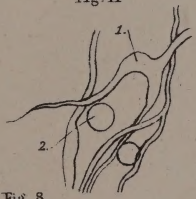

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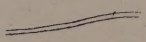
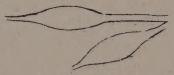


Fig 16



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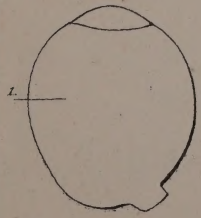

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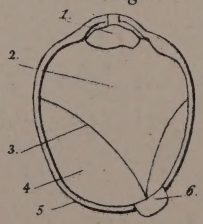

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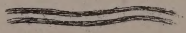

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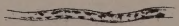
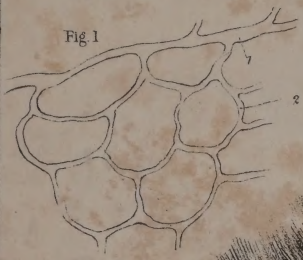
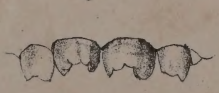
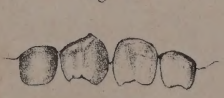


C. Bader del. J. Exleben, lith. Degr & Son, Lithoglyph. Inst. Lond.







J. Erxleben lith.

Day & Son, Lithrs to the Queen, London.

Fig. 3.

Fig. 1

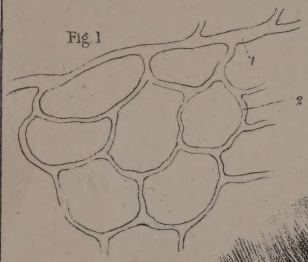
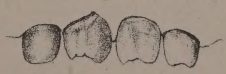


Fig. 2.

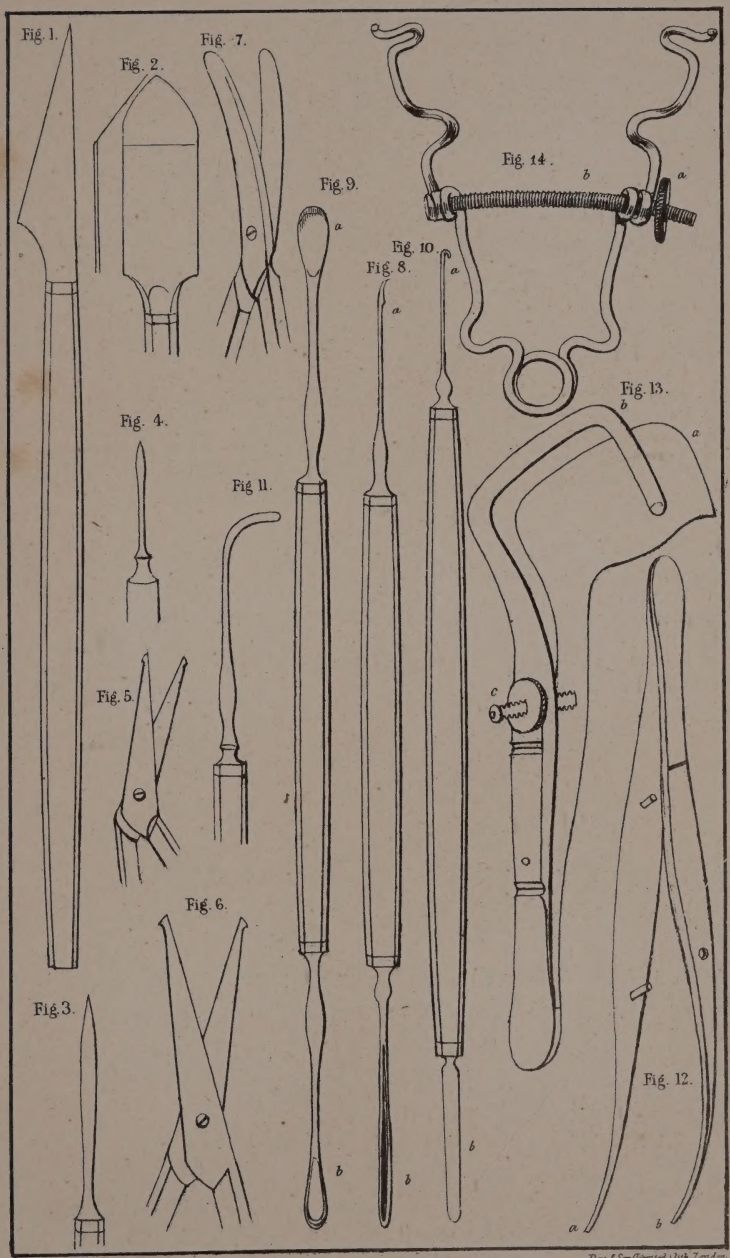
Fig. 4.

Fig. 5.



J. Erxleben lith.

Day & Son, Lithrs to the King, London.



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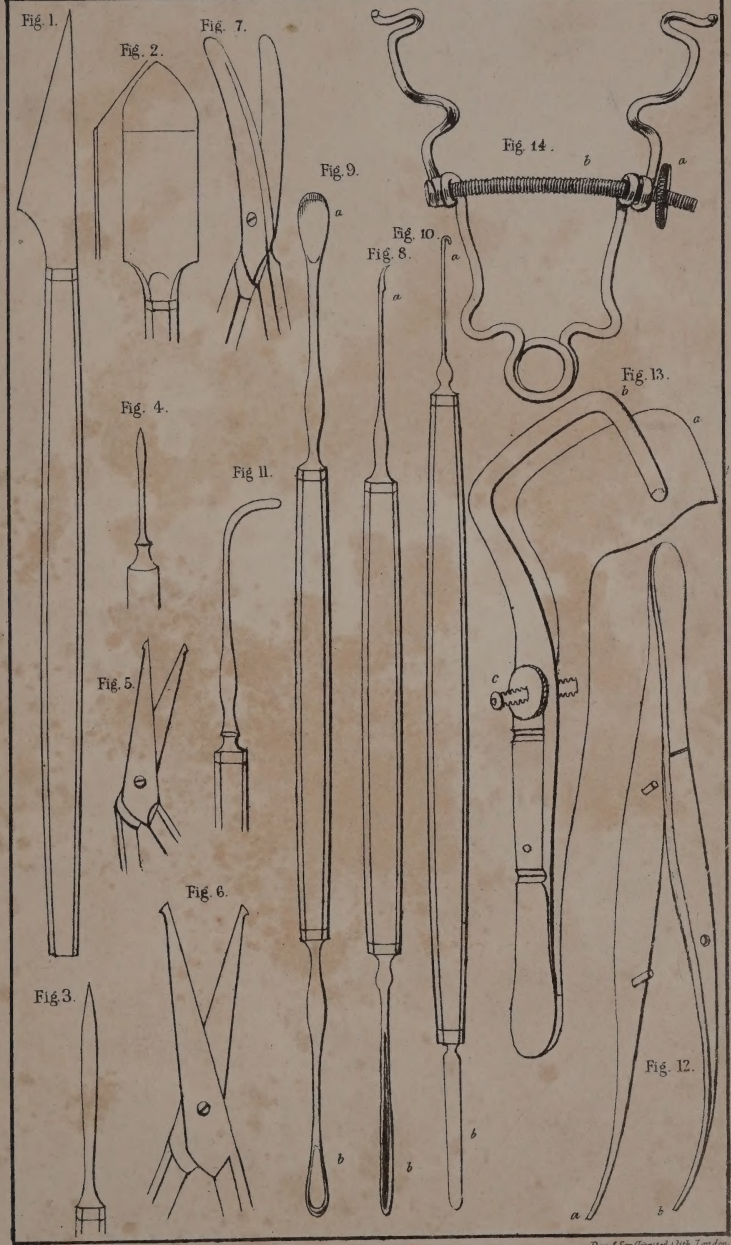

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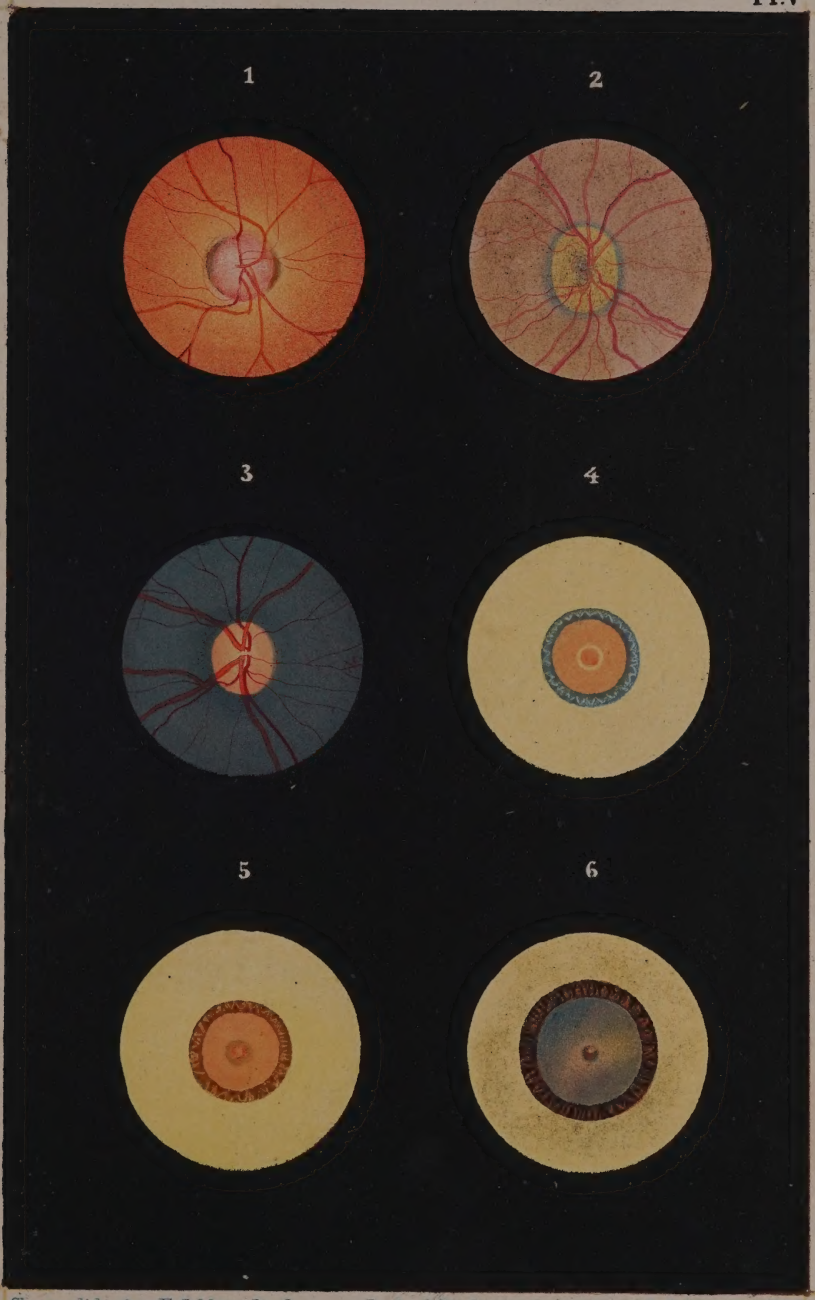
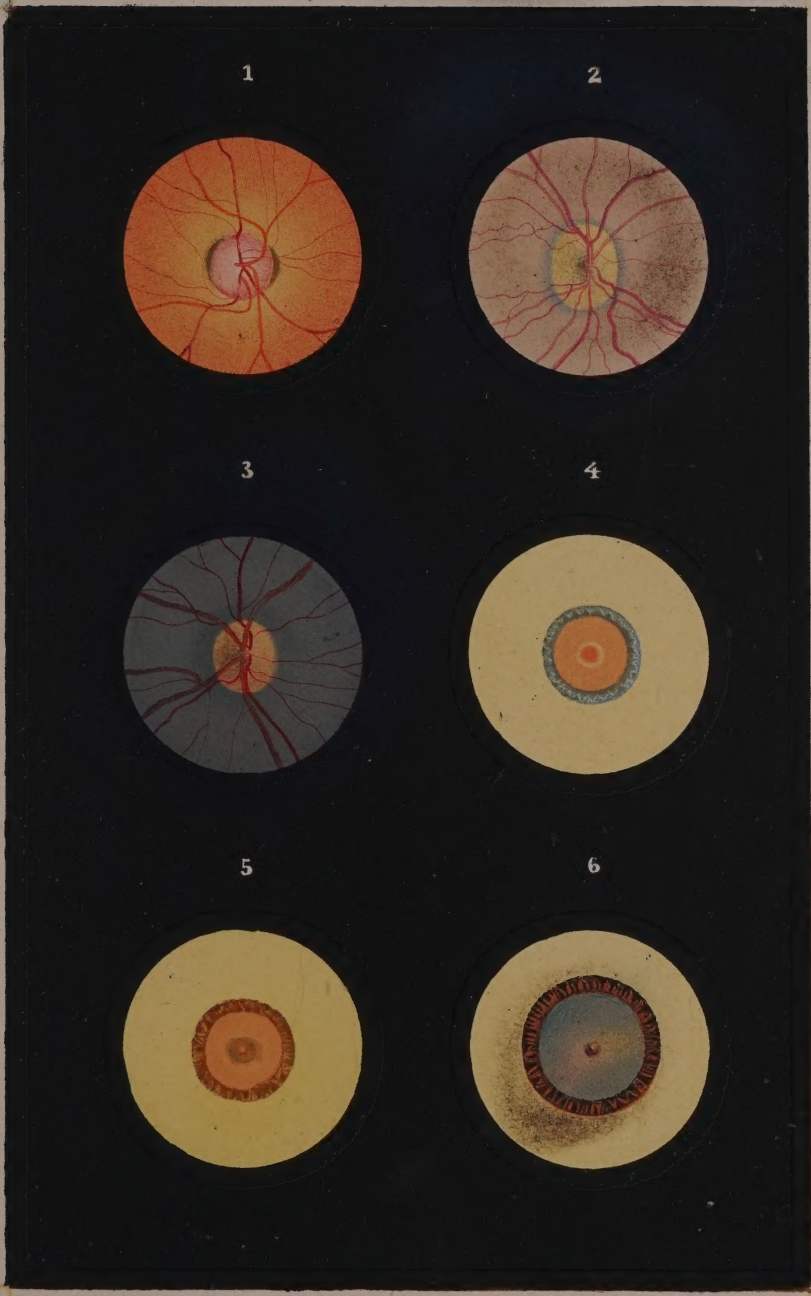


Chromolithogr v. F. Schlotterbeck. Druck v. C. Henzler R. Schweizer del.



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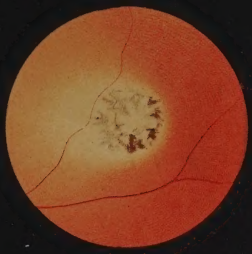

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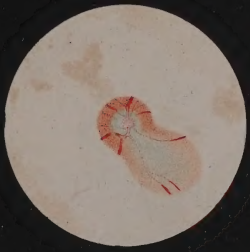

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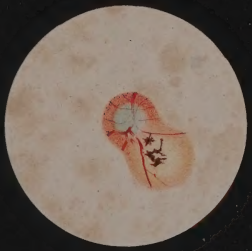

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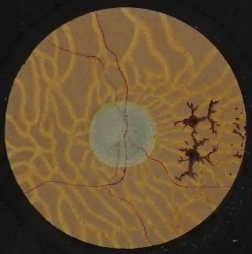

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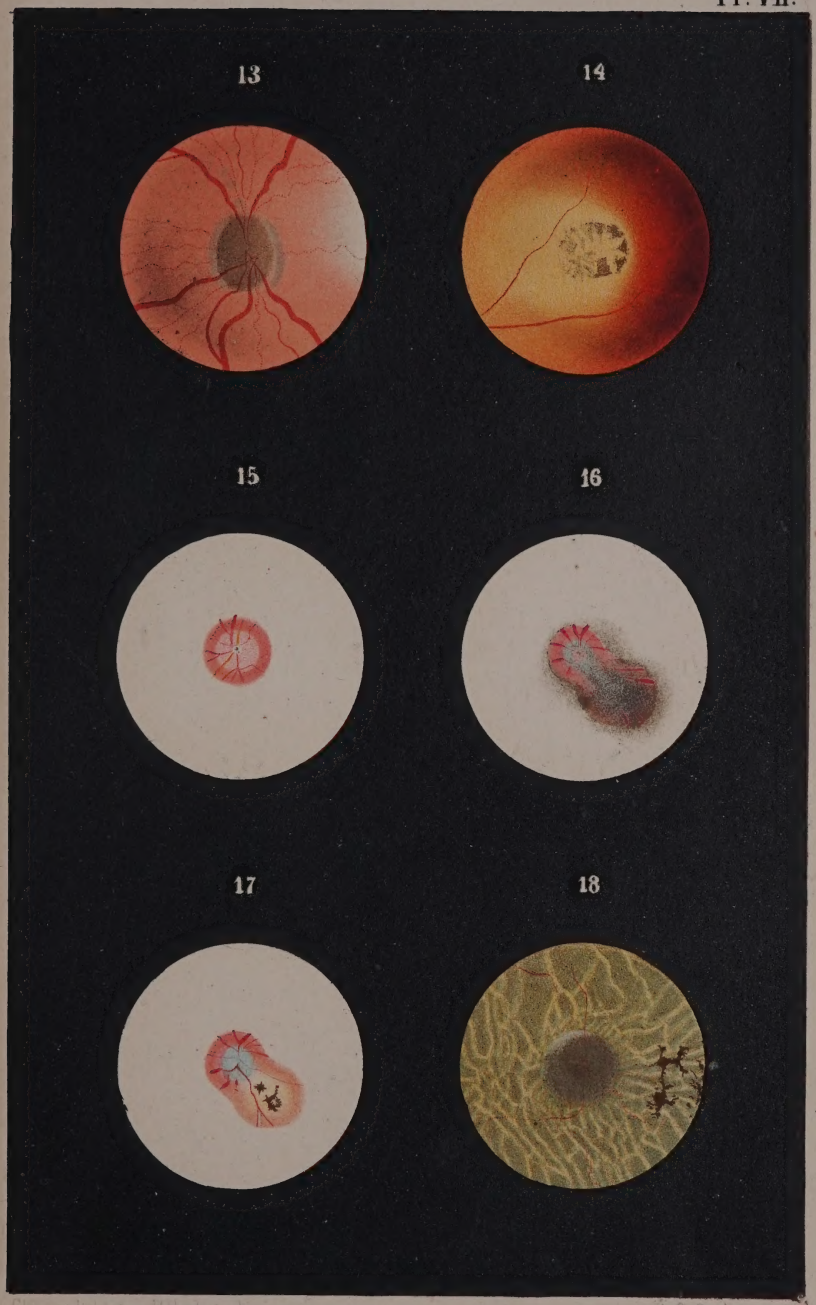

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R. Schweizer, del.

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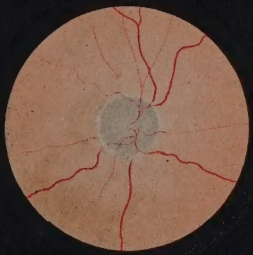

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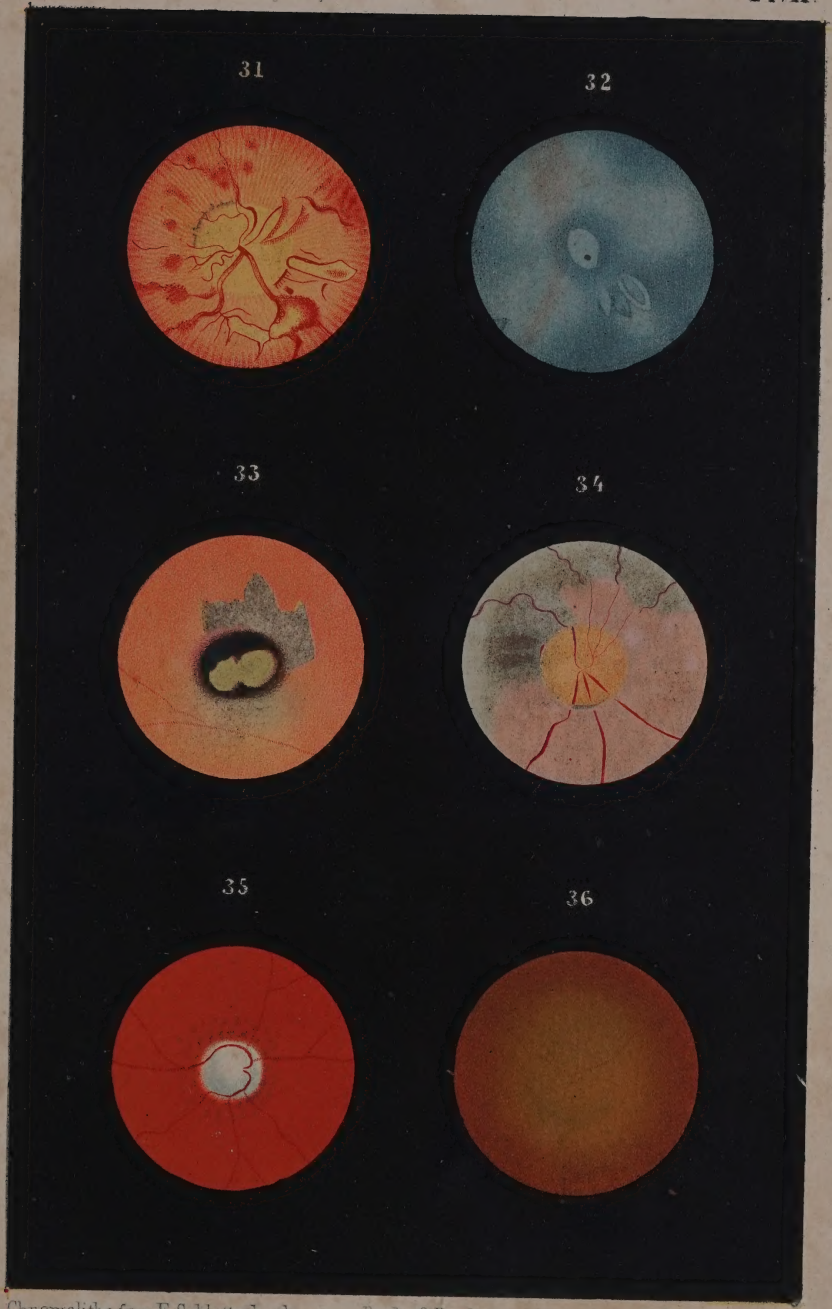

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